

(12) **UK Patent Application** (19) **GB** (11) **2 155 970 A**  
 (43) Application published 2 Oct 1985

(21) Application No **8431442**

(22) Date of filing **13 Dec 1984**

(30) Priority data

(31) **84/028311** (32) **1 Mar 1984** (33) **JP**  
**84/124579** **15 Aug 1984**  
**84/158306** **19 Oct 1984**

(51) INT CL<sup>4</sup>  
**E04F 13/14**

(52) Domestic classification  
**E1D 112 117 120 2022 2121 2139 LEKH**

(56) Documents cited  
**GB 1601381** **GB 1406535** **EP A1 0088658**

(58) Field of search  
**E1D**

(71) Applicant  
**Nippon Light Metal Company Limited (Japan),**  
**13-12 3-chome, Mita, Minato-ku, Tokyo, Japan**

(72) Inventors  
**Shizuo Uga**  
**Shuhei Kamata**  
**Katsuji Yamakawa**  
**Isao Kojima**

(74) Agent and/or Address for Service  
**Withers & Rogers,**  
**4 Dyers Buildings, Holborn, London EC1N 2JT**

(54) **Wall cladding**

(57) A wall-facing assembly comprises tiles 15 having grooves 10, 11 in the rear face mounted on support members 4, 30 having angled ribs 6, 7, 31, 32 which engage in the grooves 10, 11; resilient separators 12, 39 are arranged to prevent vertical movement of the tiles. The support members are spaced from the wall by ribs 8, 9 and the tiles may be spaced from the support members by spacers 33. The ribs 6, 7, 31, 32 may be arranged as water drains.

FIG. 3

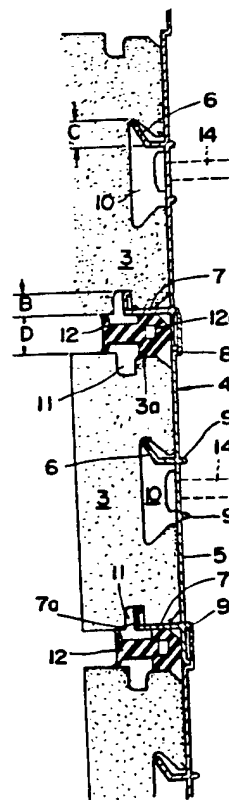
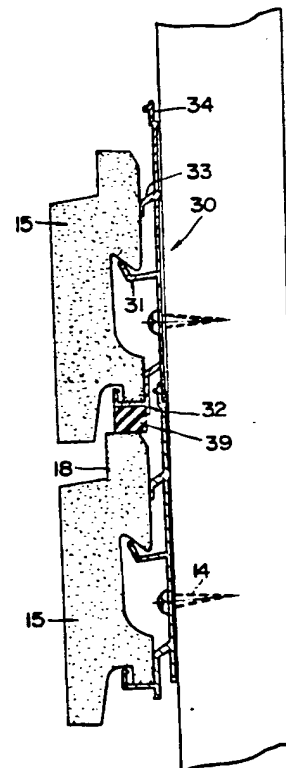


FIG. 14



The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.  
 This print embodies corrections made under Section 117(1) of the Patents Act 1977.

1/6

FIG. 1

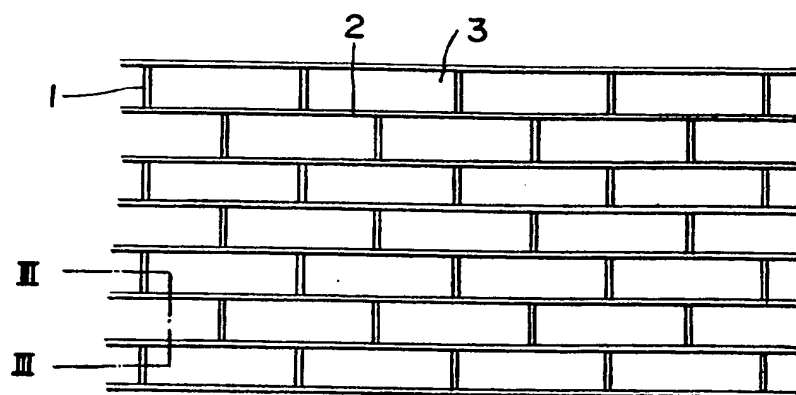
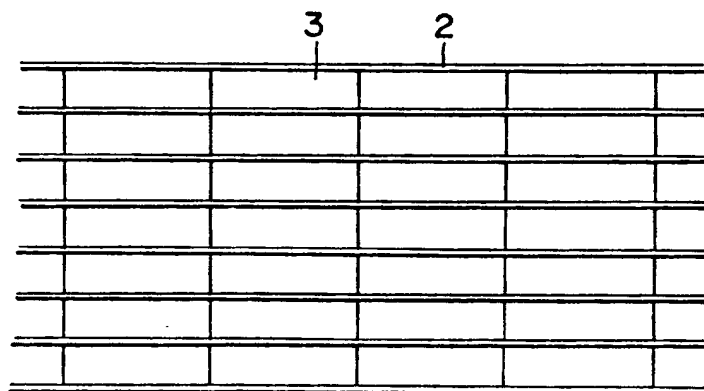


FIG. 2



216

2155970

FIG. 3

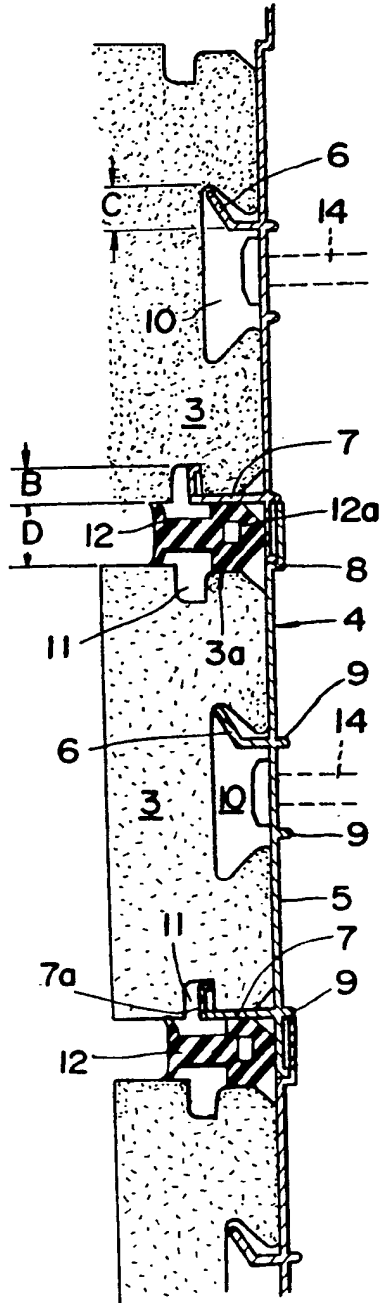


FIG. 4

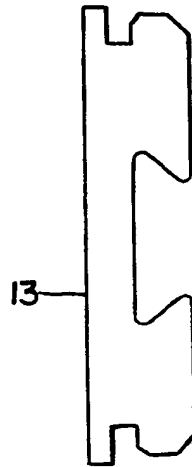


FIG. 5

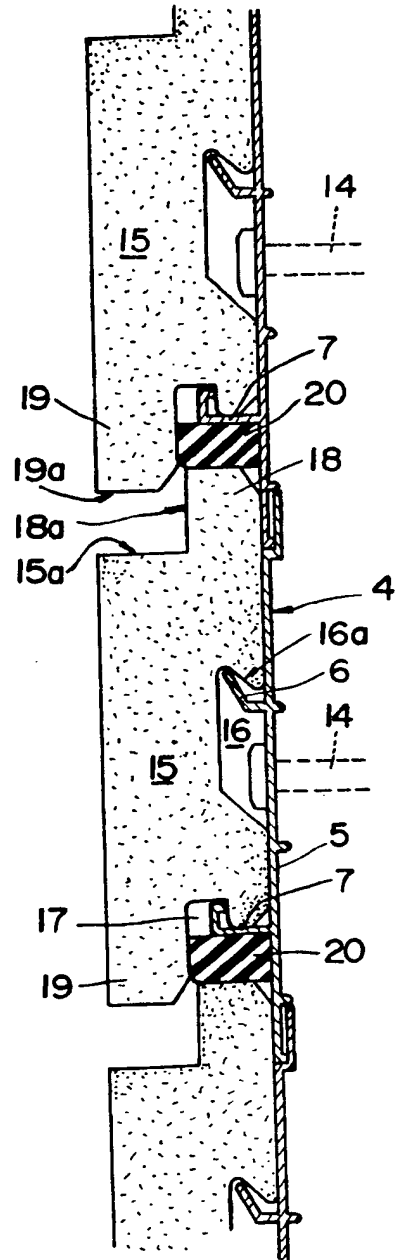


FIG. 6

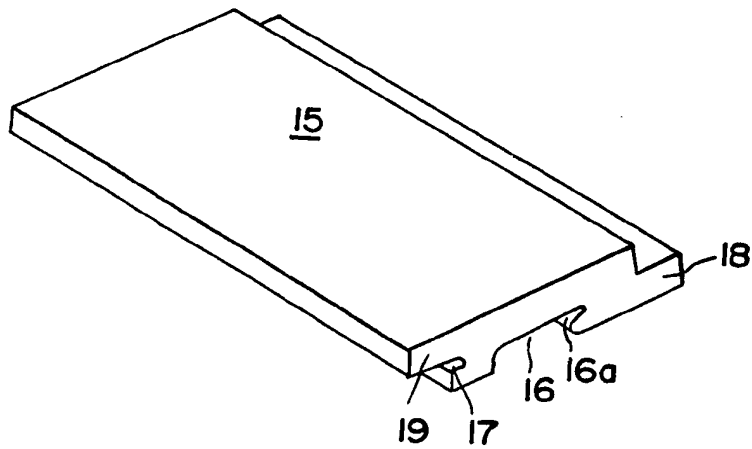


FIG. 9

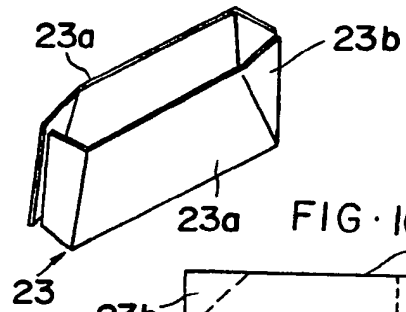


FIG. 10

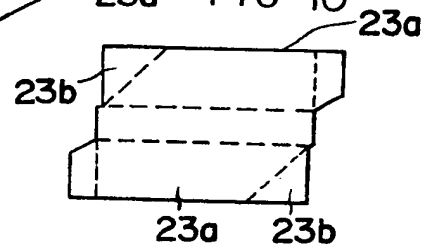


FIG. 11



FIG. 7A

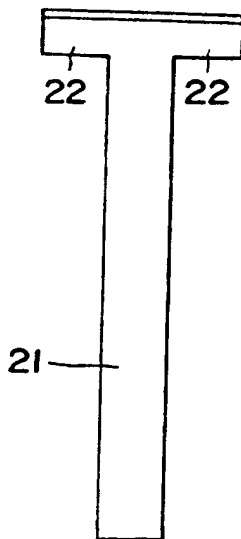


FIG. 7B

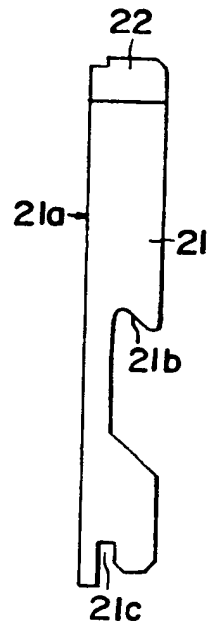


FIG. 8A

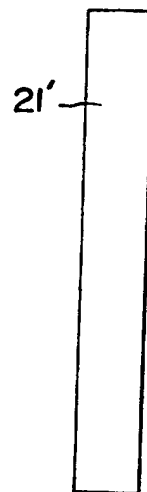


FIG. 8B

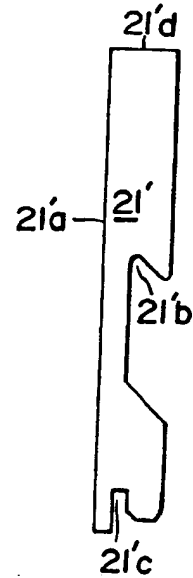
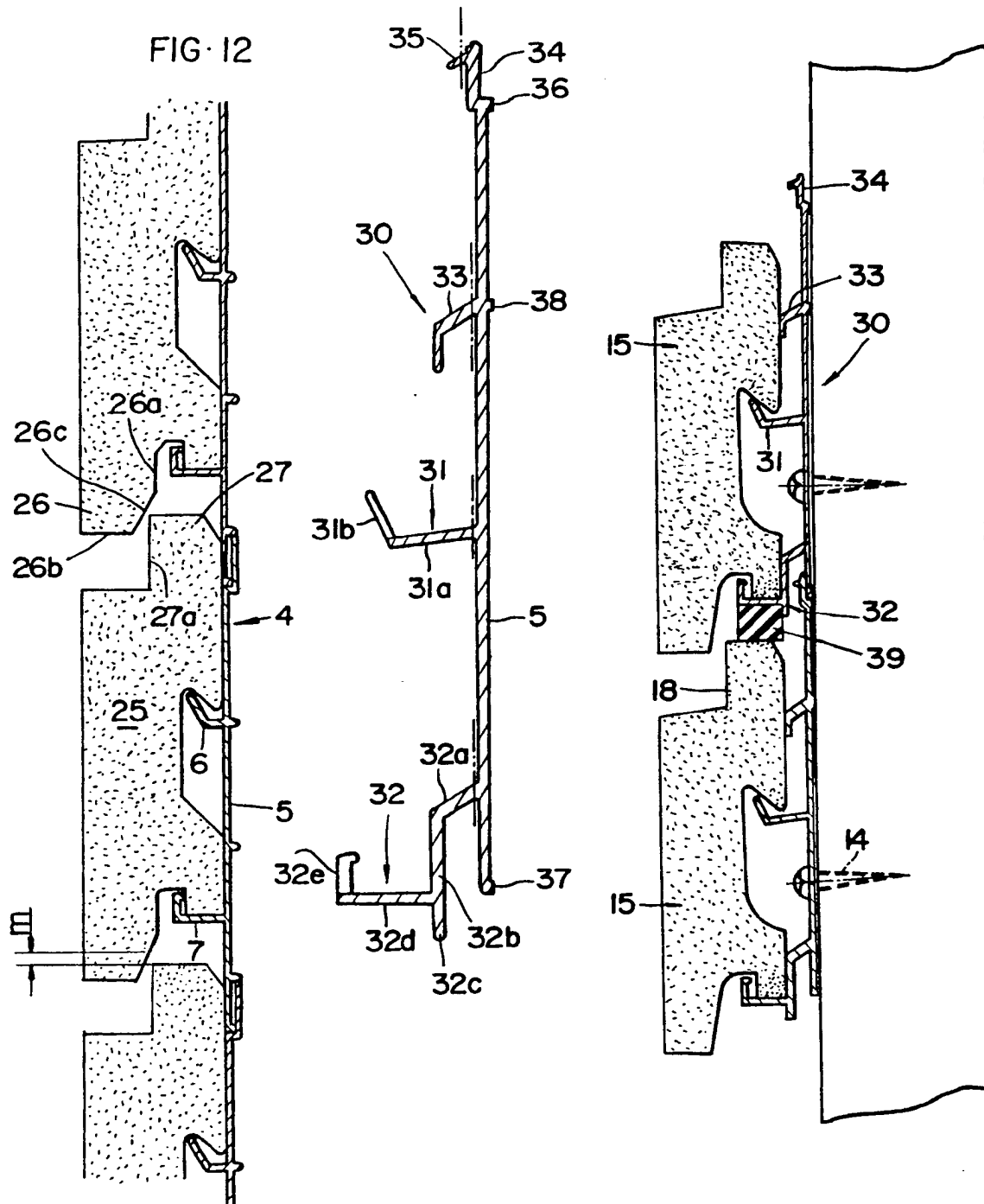


FIG. 13

FIG. 14



516

FIG. 15

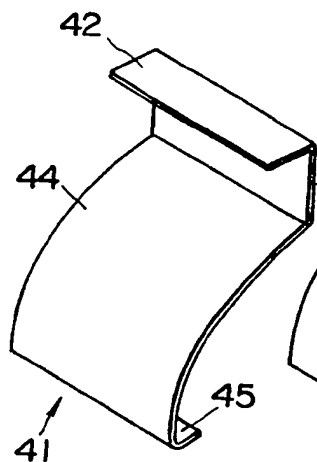


FIG. 16

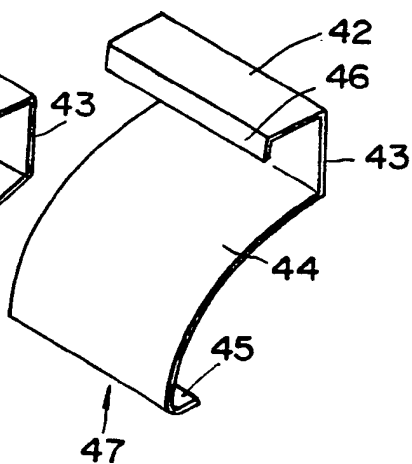


FIG. 17

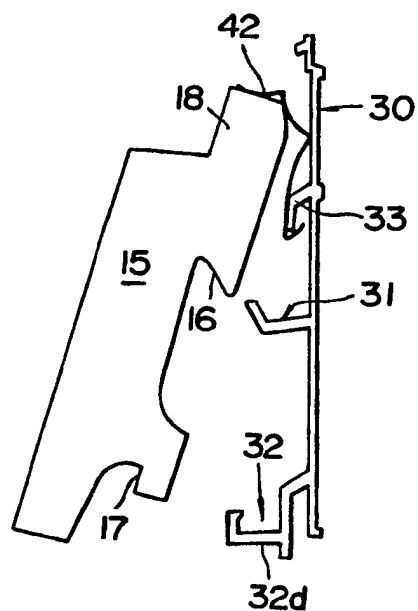


FIG. 18

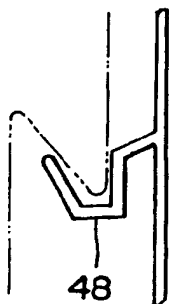


FIG. 19

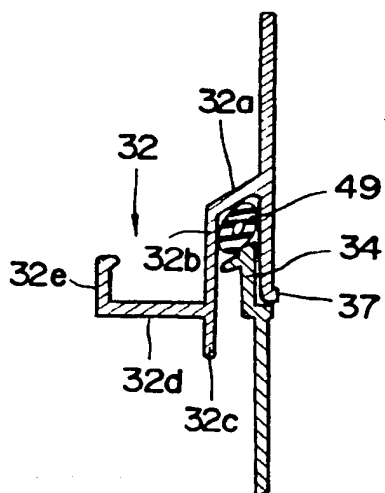
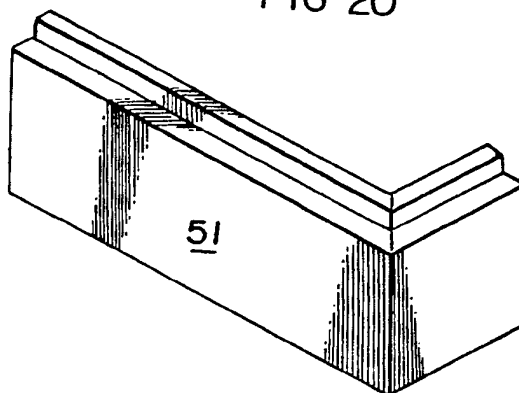


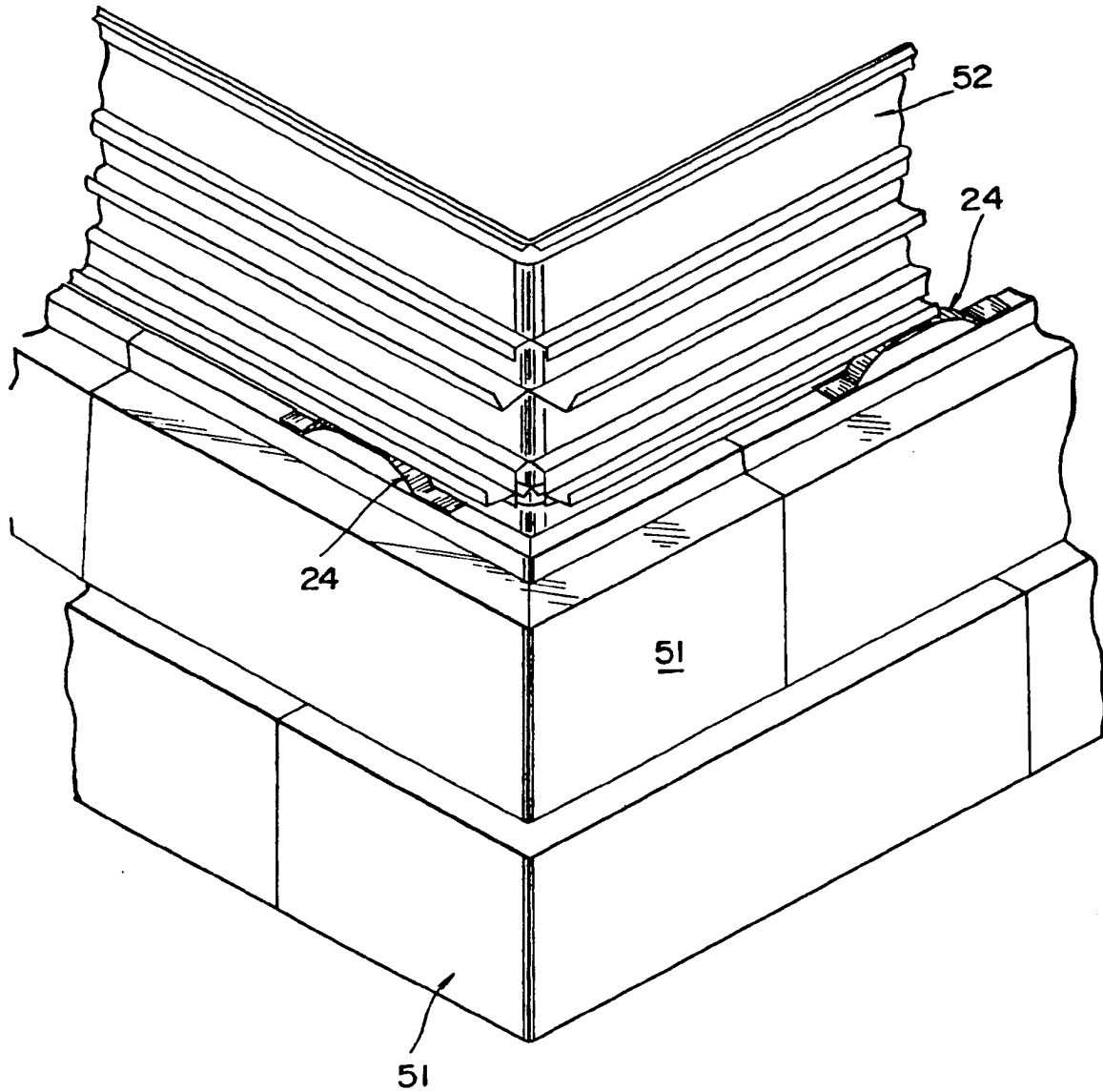
FIG. 20



6/6

2155970

FIG. 21



## SPECIFICATION

### Surface finish of structure with tiles

#### 5 BACKGROUND OF THE INVENTION FIELD OF THE INVENTION

This invention relates to surface finish of a structure such as a building, and more particularly to surface finish using tiles on the surface.

#### DESCRIPTION OF THE PRIOR ART

The term "tile" as used in this specification means not only thin plates of fired clay used for surfacing ordinary walls but also other similar thin-plate pieces applied on walls, floors, and other objects to serve as their surfaces. Thus, thin-plate bricks as well as ceramic tiles and glass tiles are embraced by this term.

The term "upper" "lower" "upward" "downward" "vertical" and "horizontal" as used in the specification in designating direction means the direction in which the surface of the finished wall lies. The expression "surface" means the surface of the wall in its finished condition. The term "Rear face" means the side opposite the surface. The term "row" used in the specification indicates a row of tiles arranged along a support member which is described hereinafter.

It is widely known to use tiles in surface finishing exterior walls, interior walls, in building, and gates and other similar structures.

Use of thin-plate bricks in the place of tiles on the external walls of buildings has been finding growing adoption because such bricks confer upon the buildings the sumptuousness of the nature proper to a wall of regularly masonry walls.

The methods heretofore used in the surface finish with tiles include (1) the method of tile facing in site, (2) the method of using preformed molds for tiles, and (3) the method of using tile-preformed precast reinforced concrete slabs.

The conventional method of tile facing in site entails the steps of applying one tile after another on a backing material of mortar or other similar material with wet mortar as a bonding agent and, after the mortar as the bonding agent has set, finishing the joints with joint mortar. The method, therefore, has a disadvantage that the whole course of work consumes much time and the mortar sections, on elapse of one to two years from the completion of work, begin to show signs of the phenomenon of efflorescence.

Further, the method of using preformed molds for tiles and the method of using tile-preformed precast reinforced concrete slabs inevitably require use of concrete and, consequently, consume much time and labor and take up large spaces. Thus, they are both

liable to suffer from high cost.

As one means of solving all these problems, there has been proposed a method of covering a backing material with plates each provided with a plurality of parallel preformed raised strips and fastening tiles to the raised strips with a fastening member (U.S.P. No. 4,238,915 dated December 16, 1980 and issued to Yoshio Yoshida, inventor). These plates have fastening members of slender metal plate attached in advance to the raised strips so that the fastening of tiles to the plates will be accomplished by allowing receiving grooves formed in advance on the rear sides of the tiles to be fitted on the fastening members. The resilience of the metal plates of the fastening members is utilized to fasten the tiles. In actuality, however, since tiles are produced by firing molded pieces of clay, they suffer from poor dimensional accuracy. The resilience of the fastening members alone, therefore, is not sufficient for keeping tiles with ample fastness to the wall surface. Some of the tiles may be fitted to be fastening members with difficulty and others may be easily fitted to the fastening members and may be readily removed. Ready separation of such tiles implies a grave menace. To preclude the ready separation of tiles, therefore, some other means must be adopted to secure the tiles to the plates. The invention mentioned above, therefore, contemplates filling up all the joints between the adjacent tiles with a substance such as mortar which possesses adhesive power. This method completes a wall surface with the work of filling the joints. This work consists in filling the narrow gaps with the mortar and, therefore, proves difficult for unskilled laborers. This method, accordingly, entails an addition to the number of steps of work and an increase in the time for the work.

#### SUMMARY OF THE INVENTION

This invention has originated in a determination to overcome the disadvantages suffered by the conventional methods as described above, and it is aimed at providing a surface-finishing construction capable of easily producing tiled surfaces on a structure.

A further object of this invention is to provide a finishing construction for producing tiled surfaces which have no use for any extra work of fastening individual tiles with a bonding agent such as mortar.

The objects described above are accomplished by a surface-finishing construction which comprises applying on the surface of a given structure a support member having integrally preformed on the surface thereof a first upwardly projecting engaging part and a second projecting engaging part as vertically separated by a fixed distance, attaching to the support member a tile having preformed on the rear side thereof a downwardly slanted engaged part adapted for engagement with



the grooved first engaging part, the end of the tile being extended to the aforementioned second engaging part, in such a manner that the aforementioned first engaged part will fit on the first engaging part, and finally inserting a separation arrester between the end of the tile and the second engaging part of the support member.

A surface-finishing construction in accordance with the invention is readily applied and will resist displacement, in particular withstanding vibrations caused, for example, by minor earthquakes.

The invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 is a front view of a wall surface formed in an embodiment of this invention;

Figure 2 is a front view of a wall surface finished in another form;

Figure 3 is a cross section taken along the line III-III in the diagram of Figure 1;

Figure 4 is a side view of a packing for use in a vertical joint;

Figure 5 is a cross section illustrating the shape of a tile similarly to Figure 3;

Figure 6 is a perspective view of a tile in a different shape;

Figure 7A, B and Figure 8A, B are respectively front view and side view of packings of other shapes for use in vertical joints;

Figure 9 is a perspective view of an embodiment of separation arrester;

Figure 10 is a development of the separation arrester of Figure 9;

Fig. 11 is a front view of another embodiment of separation arrester.

Fig. 12 is a cross section illustrating yet another embodiment of wall surface similarly to Fig. 3.

Fig. 13 is a cross section illustrating another typical support member.

Fig. 14 is a cross section illustrating still another embodiment similarly to Fig. 3.

Fig. 15 and Fig. 16 are perspective views illustrating other embodiments of separation arrester.

Fig. 17 is a side view illustrating the condition of attachment of a tile to a support member by the use of the separation arrester of Fig. 15.

Fig. 18 is a side view illustrating a portion of another embodiment of the support member.

Fig. 19 is a cross section illustrating a typical condition in which one support member is superposed on another support member.

Fig. 20 is a perspective view of outside angle tiles.

Fig. 21 is a perspective view illustrating a corner of two walls formed by working the present invention.

## MENT

Fig. 1 is a front view of a wall surface formed by an embodiment of this invention. This wall is produced by arranging tiles in a staggered pattern, with vertical joints 1 and horizontal joints 2 formed around the ends of the tiles 3. Fig. 2 illustrates a wall which is produced by arranging tiles in a plurality of horizontal rows, with no space left between the horizontally adjacent tiles 3. Of course, the tiles so arranged are not exclusively used on walls. They may be used for decorating room interiors or forming surfaces on gate posts, for example.

In the pattern of Fig. 1, the tiles are so arranged that the vertical joints are not continued but staggered in the vertical direction. In the pattern of Fig. 2, the tiles are so arranged that the vertical joints are continued in straight lines throughout the plurality of rows. This invention can be worked equally effectively for both the patterns. This difference of the two patterns does not imply any variation in the manner in which this invention is worked.

Fig. 3 is a cross section taken along the line IIIIII in the diagram of Fig. 1. The tiles 3 are fixed in place by being engaged with support members 4.

The support member 4 is a strip of shaped member produced by extruding aluminum alloy. One support member 4 has a length such that a plurality of tiles will be fastened thereto. As noted from the illustrated cross section, the support member 4 comprises a planar base plate 5, a first engaging part 6 and a second engaging part 7 both formed on the surface side of the base plate 5, and a stepped part 8 formed at the upper end of the base plate 5. On the rear side of the base plate 5, protuberances 9 are formed at proper positions so that when the base plate 5 is attached to the backing materials of wall, it will not be bent owing to the presence of the stepped part 8.

The first engaging member 6 is raised perpendicularly from the surface of the base plate 5 substantially at the center and bent aslant upwardly in the leading end thereof. The second engaging member 7 formed at the lower side of the base plate 5 at a fixed distance from the aforementioned first engaging member 6 is perpendicularly raised from the base plate 5 and bent again substantially at a right angle upwardly in the leading end 7a thereof.

The tile 3 is a simple rectangular piece of a suitable thickness, provided at the center on the rear side thereof with a first engaged part 10 formed in the shape of a dovetail to admit into fast engagement therewith the leading end of the first engaging part 6 and in the upper and lower faces thereof each with a second engaged part 11 formed in the shape of a groove to admit the leading end 7a of the

aforementioned second engaging part 7. This second engaged part 11 may be a simple groove. It is for the purpose of enabling the tile 3 to acquire symmetry and lose directionality in the vertical direction that the first engaged part 10 is formed in the shape of a dovetail and the second engaged parts 11 are formed one each in the upper and lower faces. Where the tile 3 tolerates directionality, the second engaged part 11 may be formed on only one side and the first engaged part 10 is not required to be formed in the shape of a dovetail. What is important is that the first and second engaging parts 6, 7 and the first and second engaged parts 10, 11 should be so adapted as to secure the tile 3 to the support member 4 when the tile is lowered as held tightly against the support member 4. Thus, the engaging parts and the engaged parts may be formed in any construction so far as they fulfil the requirement just mentioned. Owing to the functions, they are both required to be directed upwardly.

The height of the tile 3 is such that when tiles are attached to support members 4, a fixed distance  $D$  destined to constitute a horizontal joint 2 intervenes between two vertically adjacent rows of tiles. This distance  $D$  is required to be larger than the larger of the two allowances  $C$  and  $B$  for the first engaging part 6 and the second engaging part 7.

A horizontal joint packing 12 having an illustrated cross section is inserted in the aforementioned horizontal joint. Since the second engaging part 7 of the support member 4 is intended for engagement with the second engaged part 11 formed on the lower side of the tile 3, the raised portion thereof will cover the rear side behind the second engaged part 11 of the lower face of the tile. As the result, the bottom part 12a of this packing 12 in the illustrated embodiment is inserted into the gap between the second engaging part 7 of the support member 4 and the upper face 3a of the tile 3. When the tile 3 is brought into engagement with the support member 4 and the horizontal joint packing 12 is subsequently inserted as described above, the tile 3 is pushed by the bottom part 12a of the packing downwardly in the direction of engagement. Thus, the tile is not suffered to separate accidentally from the support member.

Owing to the construction described above, the packing 12 can be inserted easily and, after the wall is finished, this packing 12 serves to apply force constantly in the direction of preventing otherwise possible separation of the tile. In other words, this horizontal joint packing serves as a separation arrester. This horizontal joint packing 12 may be produced in the form of a strip similarly to the support member. otherwise, it may be produced in a limited length, so that a plurality of packings 12 will be laid side by side without

interposing any gap therebetween. In the vertical joint 1, a vertical joint packing 13 having a height equalling the height of the tile as illustrated in Fig. 4 is inserted. These packings are made of an elastic material such as synthetic resin or synthetic rubber.

The support member 4 is fastened with screws or nails 14 to a backing member disposed on the wall structure. Since the support member 4 is formed of shaped member of aluminum alloy as described above, it enjoys very high dimensional accuracy. When the lower end of a support member in the upper row is brought into intimate contact with the stepped part 8 of a support member in the lower row, these two support members fall parallelly to each other. When the support member in the uppermost row or in the lowermost row is secured horizontally, all the other support members are set horizontally by simply causing the lower ends thereof to come into tight engagement with the corresponding stepped parts 8. After all the support members are horizontally attached to the backing member, the tiles 3 are lowered as applied fast to the support members. Consequently, the tiles 3 are fastened to the support members as the first engaged parts 10 and the second engaged parts 11 of the tiles are received into fast engagement by the first engaging parts 6 and the second engaging parts 7 of the support members. When the tiles are arranged so as to incorporate vertical joints, vertical joint packings 13 are attached as nipped between adjacent tiles at the time these tiles are fastened to the support members. After the tiles have been fastened to the support members in all the rows or in some specific rows, the horizontal joint packings 12 are inserted between the second engaging parts 7 and the upper faces 3a of the tiles 3 to immobilize the tiles against the support member and finish the wall surface.

When the joints are filled with packings of elastic material as contemplated by the present invention, desired replacement of any of the tiles can be effected simply by removing the particular horizontal joint packing 12 which directly overlies the packing being replaced.

Fig. 5 is a cross section illustrating, similarly to Fig. 3, an embodiment which involves use of tiles 15 possessing a protruded part 18 and a hung part 19. Since the support member 4 has the same shape as that of Fig. 3, it is denoted by the same numerical symbol. Figure 6 is a perspective view showing the tiles 15. Since the tile in this case has no respect to symmetry, the first engaged part 16 has only the upper side 16a thereof shaped to suit engagement with the first engaging part 6 and the second engaged part 17 in the shape of a groove is formed only on the lower side of the tile 15. The aforementioned protruded part 18 and the hung part

19 are adapted so that the upper end of the protruded part 18 of a tile in the lower row will assume its position in the empty space between the hung part 19 and the support member 4 and the hung part 19 cover the leading end of the protruded part 18 as illustrated in Fig. 5. Thus, the lower end face 19a of the hung part 19 and the upper face 15a of the tile 15 give rise to a distance destined to form a horizontal joint and the surface 18a of the protruded part 18 is exposed through this gap of horizontal joint. The horizontal joint in the illustrated embodiment is not required to be filled with any packing because only the surface 18a of the protruded part which is similar to the surface of the tile 15 is exposed through the gap. To permit effective engagement between the tile 15 and the support member 4, the heights of the allowances of the first and second engaging parts 6, 7 for engagement are required to be smaller than the distance between the second engaging part 7 and the upper end of the protruded part 18 similarly to the construction of Fig. 3. In this case, a separation arrester 20 is required to be inserted so as to preclude the possibility of the tile 15 accidentally separating from the support member 4. This separation arrester 20 is formed of an elastic material such as formed chloroprene rubber, for example. It may be produced in the form of a strip or in a limited length.

In the present embodiment, vertical joints may be formed or they may be excluded by arranging tiles 15 side by side to eliminate intervening space as illustrated in Fig. 2. When vertical joints are formed at all, they must be filled with packings. In the case of the present embodiment, packings 21 shaped as shown in Fig. 7 are inserted. The packing 21 is provided on both sides of the upper end thereof with projected pieces 22 which serve as the separation arrester 20. The surface 21a of this packing 21 falls flush with the surface 18a of the protruded part 18 of the tile 15 which constitutes the bottom face of the horizontal joint when the packing 21 is inserted home in the joint. The packing 21 is provided on the rear side thereof with a first engaged part 21b identical in shape with the first engaged part 16 of the tile 15 and in the lower face thereof with a second engaged part 21c identical in shape with the second engaged part 17 of the tile 15. When the packing 21 provided with such projected pieces 22 is used in filling the joint, the aforementioned separation arrester 20 is no longer necessary. In the illustrated embodiment, the projected pieces 22 are formed one each on the opposite sides of the packing 21. Optionally, one of them may be omitted. When the separation arrester 20 of the form of a strip is adopted, packings 21' which lack projected piece 22 as shown in Fig. 8 are used. This packing 21' is identical in shape

with the packing 21, except for the exclusion of the projected pieces 22. The height of this packing 21' to the upper end 21'd is equal to the height of the tile 15 from the lower face to the leading end of the protruded part 18. The symbols 21'a, 21'b, and 21'c of the packing 21' denote the parts identical to the parts 21a, 21b, and 21c respectively of Fig. 7. In the construction described above, the packings inserted in the joints immensely improve the watertightness of the produced wall surface.

The embodiment described above uses separation arresters made of a flexible material such as rubber. Optionally, these separation arresters may be produced by bending metal sheets of stainless steel, for example, as illustrated in Fig. 9 and Fig. 11.

The separation arrester illustrated in Fig. 9 can be formed by cutting a metal sheet in the shape illustrated in Fig. 10 and folding the cut sheet along the portions indicated by dotted lines. The lateral faces 23a are folded as opened slightly larger than right angle to as to be vested with resiliency. The leading ends 23b of the lateral faces 23a are folded so as to be converged. This convergence is intended to facilitate the insertion of the separation arrester between the tile and the second engaging part. The separation arrester of Fig. 11 is formed by causing a central portion of a strip of metal sheet to be curved semicircularly as illustrated.

The method by which the construction of Fig. 5 is effected is not different appreciably from that of the previous construction. To be concrete, it is accomplished by simply attaching the support members 4 fast to the backing materials, then fastening the tiles 15 to the support members 4 sequentially upwardly from the lowermost row of support members 4 through engagement of the engaging parts and the engaged parts, and inserting the separation arresters 20, 23, or 24. When the packings 21 possessing projected pieces 22 are used, the construction is accomplished by simply fastening the tiles, while keeping the packings nipped therebetween, to the support members.

Fig. 12 is a cross section illustrating a construction using tiles of further altered shape similarly to Fig. 3. The support member 4 and the first and second engaged parts of the tile 25 are identical in shape with the counterparts in the construction of Fig. 5. The hung part 26 and the protruded part 27 in the present construction are slightly different in shape from the counterparts of Fig. 5 and no separation arrester 20 is used. Packings 21' illustrated in Fig. 7 are used in filling vertical joints when the construction involves formation of such vertical joints.

The thickness of the protruded part 27 in the illustrated construction (the distance from the surface 27a and the surface of the sup-

port member 4) is larger than the distance from the surface of the support member 4 to the face 26a on the rear side of the hung part 26 and a diagonal face 26c is formed to

5 connect the face 26a and the lower face 26b of the hung part 26. Consequently, the leading end of the projected part 27 of a tile 25 in the lower row collides against this diagonal face 26c when the tile 25 is slightly moved  
10 upwardly. The amount of movement  $m$  which the tile 25 has to make before this collision is required to be smaller than either of the aforementioned allowances  $B$ ,  $C$  for engagement. This collision of the protruded part 27  
15 against the hung part 26 serves to prevent the tile 25 from coming off the support member 4. In the case of the present construction, therefore, the tiles are not immobilized but are allowed to be kept in a state enjoying freedom  
20 of motion over the aforementioned distance  $m$ .

This construction is accomplished by simply attaching the tiles 25 to the support members 4. Since the tiles are not immobilized, they  
25 are allowed to move. Where the construction involves formation of vertical joints, the construction is effected by attaching the tiles, while keeping the packings nipped therebetween, to the support members.

30 When the tiles 25 are allowed to enjoy freedom of motion through over a limited distance, desired replacement of tiles 25 after completion of the construction can be effected simply. Since the tiles in each row are movable by a distance of  $m$  upwardly, the distance of motion allowed for a tile in a certain row can be doubled, trebled, and so on when the tile in the immediately upper row or two or more tiles in the successively upper row or  
40 two or more tiles in the successively upper rows are moved upwardly. Consequently, the tile which is allowed to be moved over a distance greater than the allowance for engagement can be freely removed from the wall. When any tile on the wall happens to sustain cracks or similar breakage, it can be easily replaced with a new tile at any time desired. If, in this construction, the tiles are arranged in a staggered pattern, there ensures  
45 an advantage that the tiles will not be readily separated.

Now, a construction involving use of support members of an altered shape will be described. In the case of this construction, the  
55 tiles 15 of the shape of Fig. 6 can be used in their unaltered form. The cross section of the support member 30 is shown in Fig. 13. As illustrated, this support member 30 is provided on the surface side thereof with a first  
60 engaging part and a second engaging part 32 both having at least the leading portions for engagement bent upwardly. It is further provided above the first engaging part 31 with a space-retaining rail 33 which is adapted to  
65 give rise to a space-retaining portion for keep-

ing the bottom face of the tile at a fixed distance from the surface of the support member 30 when the tile 15 is fastened to the support member. Further, the support part 30  
70 is provided at the upper end thereof with an upper end part 34 raised in the direction of the surface of the base plate by a distance substantially equal to the thickness of the base plate and then bent upwardly and extended parallelly to the base plate. The leading end part 34 is provided on the surface thereof with a flashing 35 projected aslant downwardly. The portion 36 constituting the starting point of the upper end part 34 is  
80 slightly projected from the rear face of the support member. A lower end part 37 of the carrier member is similarly projected slightly in the direction of rear face. Raised strips 38 resembling the upper end part 34 and the  
85 lower end part 37 are formed at desired positions on the rear face of the support member.

The first engaging part 31 is obtained by forming a part 31a raised slightly downwardly  
90 from the surface of the support member substantially in the central portion and bending the leading end 31b of the part 31a aslant upwardly. The part 31a is raised slightly downwardly as described above for the purpose of receiving incoming water in this part and thence transferring the received water to the root of the leading end 31b. The second engaging part 32 is composed of a slanted part 32a raised from the base plate 5 as  
95 slanted downwardly, a mounting part 32b extended downwardly from the leading end of the slanted part 32a so as to run parallelly to the base plate 5, an upright part 32d raised perpendicularly from the mounting part 32b at a position slightly above the lower end 32c of the mounting part 32b, and a retainer part 32e bent upwardly substantially at right angle from the leading end of the upright part 32d. Optionally, the upright part 32d may be  
100 slightly inclined downwardly similarly to the first engaging part. In that case, the retainer part 32e is required to run parallelly to the mounting part 32b. The distance between the mounting part 32b of the second engaging part and the base plate 5 is enough to permit insertion therein of the upper end part 34 possessing the aforementioned flashing. The surface of the mounting part 32b is formed so as to fall flush with the surface of the aforementioned space-retaining strip 33. Thus, the slanted part 32a and the mounting part 32d jointly constitute another space retaining part.

For the purpose of draining, the leading end 31b of the first engaging part 31 and the retaining part 32e of the second engaging part 32 each have cuts formed at suitable intervals in the portions indicated in Fig. 3 as being provided with packings. Through the cuts, the water received in the two raised parts 31a, 31d are allowed to flow down.  
130

The condition in which the tile 15 is attached to the support member 30 is illustrated in Fig. 14. Owing to the space-retaining strip 33, the tile is attached in place as separated from the surface of the support member. The support members are attached to the substrate with the upper end parts 34 and the lower end parts overlapping. For the reason already described, the separation arrester 39 is inserted between the protruded part 18 and the second engaging part 32 of the tile. In the illustrated construction, a packing of the same shape as shown in Fig. 5 is used. Optionally, a metal sheet fabricated as illustrated in Fig. 11 may be used instead.

As described above, the support member 30 is fastened in place with the lower end part thereof slide under the inner side of the upper end part 34 of the tile on the lower row and, moreover, the support member 30 is provided at the upper end part 34 thereof with a flashing 35. If water finds its way to the rear side of the tile 15, therefore, there is no possibility of the water further finding its way to the rear side of the support member 30. Since the empty space is formed between the support member 30 and the tile 15, the water which has reached the rear side of the tile 15 is easily enabled to flow down the support member. The construction illustrated here, accordingly, contributes to enhancing the watertightness of the tiled wall.

If the support member 30 and the tile 15 are held fast to each other without being interrupted by the empty space, the water which has reached the rear side of the tile is not allowed to fall down but is suffered to stagnate because of the phenomenon of capillary attraction. The stagnant water has a fair possibility of penetrating through the support member 30 and reaching the rear side thereof. This trouble can be precluded by the construction described above.

Further since the leading end 31b of the first engaging part 31 and the retaining part 32e of the second engaging part 32 have cuts formed therein as described above and the leading end 32c of the mounting part 32b is thrust out to serve as a flashing, the water which has reached the rear side of the tile 15 is quickly and safely caused to fall down.

A strip of flexible packing is used as the separation arrester 39. Optionally, such flexible packing may be produced in a limited length. When a larger number of separation arrester of such a limited length are stopted instead of a smaller number of separation arresters in the form of strips, the watertightness of the wall is further improved because the pressure is instantaneously equalized inside and outside the tiles 15. This watertightness proves highly convenient when the surface-finishing construction of this invention is used where watertightness weighs much.

In the construction involving the use of the

space-retaining strips described above, such strips may be utilized as separation arresters as illustrated in Fig. 15 and Fig. 16. This separation arrester 41 is produced by bending a sheet of stainless steel in a shape consisting of a retainer part 42 adapted to hold down the upper end of the protruded part 18 of the tile 15, an auxiliary part 43 bent substantially perpendicularly from the retainer part 42, an intermediate part 44 gradually curved downwardly from the auxiliary part 43, and a hook part 45 bent at the leading end of the intermediate part 44 in such a manner as to catch hold of the space-retaining strip 33 of the support member. The separation arrester 47 of Fig. 16 is additionally provided at the leading end of the retainer part with an auxiliary hook part 46 adapted to catch hold of the upper end face of the protruded part 18 of the tile 15.

Where the construction involves use of the separation arrester of such a shape, the attachment of the tile 15 to the support member 30 may be effected as illustrated in Fig. 17. To be concrete, the attachment is accomplished by tacking the hook part 45 of the separation arrester 41 or 47 to the space-retaining strip 33, diagonally applying the upper end of the protruded part 18 of the tile 15 on the retainer part 42, lifting the tile 15 and, at the same time, turning the lower side thereof until it runs parallelly to the support member 30, and releasing the tile from the hand thereby enabling the tile 15 to be spontaneously set in place by the resiliency of the separation arrester.

In the construction described above, the space-retaining part 33 is formed separately of the first engaging part 31. Alternatively, the first engaging part 48 may be formed so as to possess a mounting part for holding the rear face of the tile 15 in much the same manner as the second engaging part 32. Thus, the mounting part can concurrently serve as a space-retaining part.

Optionally, a packing 49 may be placed as illustrated in Fig. 19 to fill the empty space which is defined by the upper end part 34 of the support member 30 and the slanted part 32a and the rear side of the mounting part 32b of the second engaging part 32 of the support member in the immediately upper row for the purpose of further enhancing the watertightness of the wall construction.

The embodiments so far described invariably concern flat sections of walls. In a corner section of a wall, tiles 51 of the shape illustrated in Fig. 20 are used. The tile 51 is formed by joining two tiles of the shape illustrated in Fig. 6 at an angle of 90 degrees, depending on the angle of the corner involved. Such a corner tile can be formed by joining two tiles of the shape illustrated in Fig. 3, Fig. 5, or Fig. 12 accordingly. The joining of the two tiles is effected by cutting the

opposed ends of the two tiles each at an angle of 45 degrees and bonding the slant ends as with epoxy-resin adhesive agent. Of course, the corner tile may be formed from the beginning in the shape contemplated. To be used effectively at the corner, the support member illustrated in any of the preceding embodiments may be formed by inserting notches of straight lines one each in the first and second engaging parts, the space-retaining strip, the flashing, etc. which protrude from the surface side of the base plate (to the position indicated by the chain line in Fig. 13) attentively not to inflict any damage to the base plate and bending the support member along the line of the notches at an angle, depending on the angle of the corner involved. The condition in which the tile is attached to the support member so fabricated is illustrated in Fig. 21.

The tiles 51 are attached to the support members 52 obtained by ending at a right angle the support members of Fig. 13. The method by which these tiles are attached to the support members is not different from the method already described. The separation arresters 24 of the shape illustrated in Fig. 11 are used herein. Thus, the wall construction at the corner can be accomplished with great ease.

All the embodiments described hereinbefore except the embodiment shown in Figure 12 exemplify the horizontal arrangement of the support member. In these embodiments, however, the slant arrangement of the support member may alternatively be adopted. Furthermore, in the embodiments shown in Figure 3, 5 and 14 employing the separation arrester the support member may be arranged perpendicularly.

The terms relevant to the upward and downward directions, which are used throughout the specification, are described with reference to the embodiments wherein the support member is arranged horizontally.

The second engaging part 7 or 32 may be composed of only a flat member excluding the leading edge such as 7a so that the flat member may function to compress the lower tile through the separation arrester to the first engaging part. In this case, the second engaging part may not always engage with the lower end of the tile. Further, the groove of the tile, in which the leading end of the second engaging part is inserted, may be eliminated to form and the lower end of the tile may be extended in vicinity of the flat member of the second engaging part but not engage therewith.

In accordance with this invention, desired surface finish of a given structure with tiles can be carried out easily without requiring use of any bonding agent such as mortar.

This invention can be suitably modified or altered without departing from the spirit and

characteristic features thereof. In all the embodiments cited above, the support members have been described as being so adapted that a plurality of tiles will be arranged in a row for each of the support members. Alternatively, the support members may be formed in an increased height so that a plurality of rows each of a plurality of tiles will be fastened to each of the support members.

## CLAIMS

1. A construction for surface finish of a structure by the use of support members adapted to be attached to the surface of said structure and tiles adapted to be fastened to said support member while forming at least joints between the tiles in the respective rows, wherein said support members are provided on the surface thereof with a first engaging part formed of an upwardly projected strip and a second engaging part formed of a projected strip at a position separated from said first engaging part and lying parallelly thereto, said tiles are provided on the rear side thereof with an engaged part formed of a groove capable of admitting said first engaging part, an end of the tile extending in the vicinity of said second engaging part of said support member when secured the tiles to said support members, and separation arresters are inserted between the ends of said tiles and the second engaging parts of said support members after said tiles have been fastened to said support members through engagement between said first engaged parts of said tiles and said first engaging parts of said support members.

2. A construction according to Claim 1, wherein said support members are arranged horizontally.

3. A construction according to Claim 1, wherein said separation arresters are formed of flexible packings.

4. A construction according to Claim 1, wherein said separation arresters are formed resiliently by folding a sheet of metal.

5. A construction according to Claim 1, wherein said second engaging part is formed of a projected strip having an upwardly extended end.

6. A construction according to Claim 4, wherein said second engaging part of said support member is provided with an upwardly extending leading edge and a groove engaging with said leading end of said second engaging part is formed at the lower end of the tile.

7. A construction according to Claim 1, wherein said tiles fastened to said support members have the horizontally adjacent ends thereof held fast to each other.

8. A construction according to Claim 1, wherein said tiles fastened to said support members have the horizontally adjacent ends thereof held apart from each other and joint

members are packed in the intervening joints consequently formed therebetween.

9. A construction according to Claim 5, wherein said joint members are packings made of elastic material.

10. A construction according to Claim 1 or 4, wherein said tiles are provided at the upper end thereof with a protruding part thrust upwardly on the rear face side thereof and at the lower end thereof with a hung part thrust downwardly on the surface side thereof and said separation arresters are fitted between the upper end of the protruded part of said tile and the second engaging part and said separation arresters are covered by the front side of the hung part of the tile in the upper row.

11. A construction according to Claim 8, wherein said hung part of the tile in the upper row covers only part of the leading end of the protruded part as the upper end of the tile in the lower row and said protruded part is exposed as a joint through the gap between the tiles in the upper and lower rows.

12. A construction according to Claim 1, wherein one support member is attached to be partly superposed with adjacent support members in the rows.

13. A construction according to Claim 1, wherein said support member is provided on the surface of the base plate thereof with a space-retaining part serving to keep the tile fixed in place at a distance from said surface of the support member.

14. A construction according to Claim 11, wherein said separation arrester is formed of a sheet of metal in a shape consisting of a hook part adapted to catch hold of said space-retaining strip, a retainer part adapted to hold down one end of the tile, and an intermediate part gradually curved to interconnect said hook part and said retainer part.

15. A construction according to Claim 1 or Claim 11, wherein the first engaging part and the second engaging part of said support member have the leading ends thereof partly cut away.

16. A construction according to Claim 1, wherein said support member is provided on the surface of the base plate thereof with a space-retaining part adapted to keep the tile at a distance from said surface and the first engaging part and the second engaging part have the leading ends thereof partly cut away.

17. A construction for surface finish of a structure by the use of support members adapted to be attached in horizontal rows to the surface of said structure and tiles adapted to be fastened to said support member while forming at least horizontal joints between adjacent tiles, wherein said support members are provided on the surface thereof with a first engaging part formed of an upwardly projected strip and a second engaging part formed of an upwardly projected strip at a position separated from said first engaging

part and lying parallelly thereto, said tiles are provided on the rear side thereof with a first engaging part formed of a groove capable of admitting said first engaging part and in the lower face thereof with a second engaging part formed of a groove capable of admitting said second engaging part, and the allowances of the first and second engaging parts for engagement are larger than the distance over which the tile attached to said first and second engaging parts is allowed to move to the tile fastened to the corresponding engaging parts in the immediately upper row.

18. A construction according to Claim 15, wherein said tile is provided at the upper end on the rear face side thereof with a protruded part thrust upwardly and at the lower end on the surface side thereof with a hung part thrust downwardly in such a manner that when said tile is fastened support member, said hung part partly covers the leading end of the protruded part thrust upwardly from a tile disposed in the row immediately below said tile except for a distance destined to constitute a horizontal joint and the upper end of said protruded part, when moved upwardly, collides with the hung part of the tile in the upper row.

19. A construction for surface finish of a structure by the use of support members adapted to be attached to the surface of said structure and tiles adapted to be fastened to said support member while forming at least joints between adjacent tiles, wherein said support members are provided on the surface thereof with a first engaging part formed of an upwardly projected strip and a second engaging part formed of a projected strip at a position separated from said first engaging part and lying parallelly thereto, said support members are adapted for use in a corner of wall by inserting notches as aligned in said engaging parts and folding the base plates of said support plates in the lines drawn across the notches by an angle conforming to the angle of said corner, said tiles are provided on the rear side thereof with an engaged part formed of a groove capable of admitting said first engaging part and in one end face thereof with the end extending in the vicinity of said second engaging part of said support member when secured the tiles to said support members and said tiles are adapted for use in said corner of wall by forming therein an angle conforming to the angle of said corner of wall.

20. A surface covering comprising a plurality of tiles each of which is retained on the surface by a wedge inserted between the tile and an abutment and urging the tile against means for locating the tile in a desired position.

21. A construction for applying a surface finish of a plurality of tiles to a structure, the construction comprising cooperable location

means upon each of the tiles and upon the structure, or one or more members secured thereto, whereby the tiles may be located in a desired position, and means resisting displacement of the tiles away from the structure.

5 22. A construction according to claim 21 wherein said means resisting displacement of the tiles comprises a wedge inserted between a tile and an abutment and urging the cooper-  
10 able location means to locate the tile in said desired position.

23. A construction according to claim 21 wherein the structure extends in vertical direc-  
15 tion, the cooperable location means comprise means on each tile and on the structure or member secured thereto, whereby the tiles may be hung upon the structure, and said  
20 means resisting displacement of the tiles comprises contoured edge portions upon the upper and lower edges of a tile which cooperate  
25 with the contoured edge portions of tiles above and below to limit lateral movement of the tile in the plane of the tile to a distance less than the distance required to release the  
tile from its hanging location with the structure.

24. A construction for applying a surface finish substantially as hereinbefore described and illustrated with reference to the different  
30 embodiments illustrated in the accompanying drawings.

Printed in the United Kingdom for  
Her Majesty's Stationery Office, Dd 8818935, 1985, 4235.  
Published at The Patent Office, 25 Southampton Buildings,  
London, WC2A 1AY, from which copies may be obtained.